



DeIDOT's Systemic Safety Improvement Program

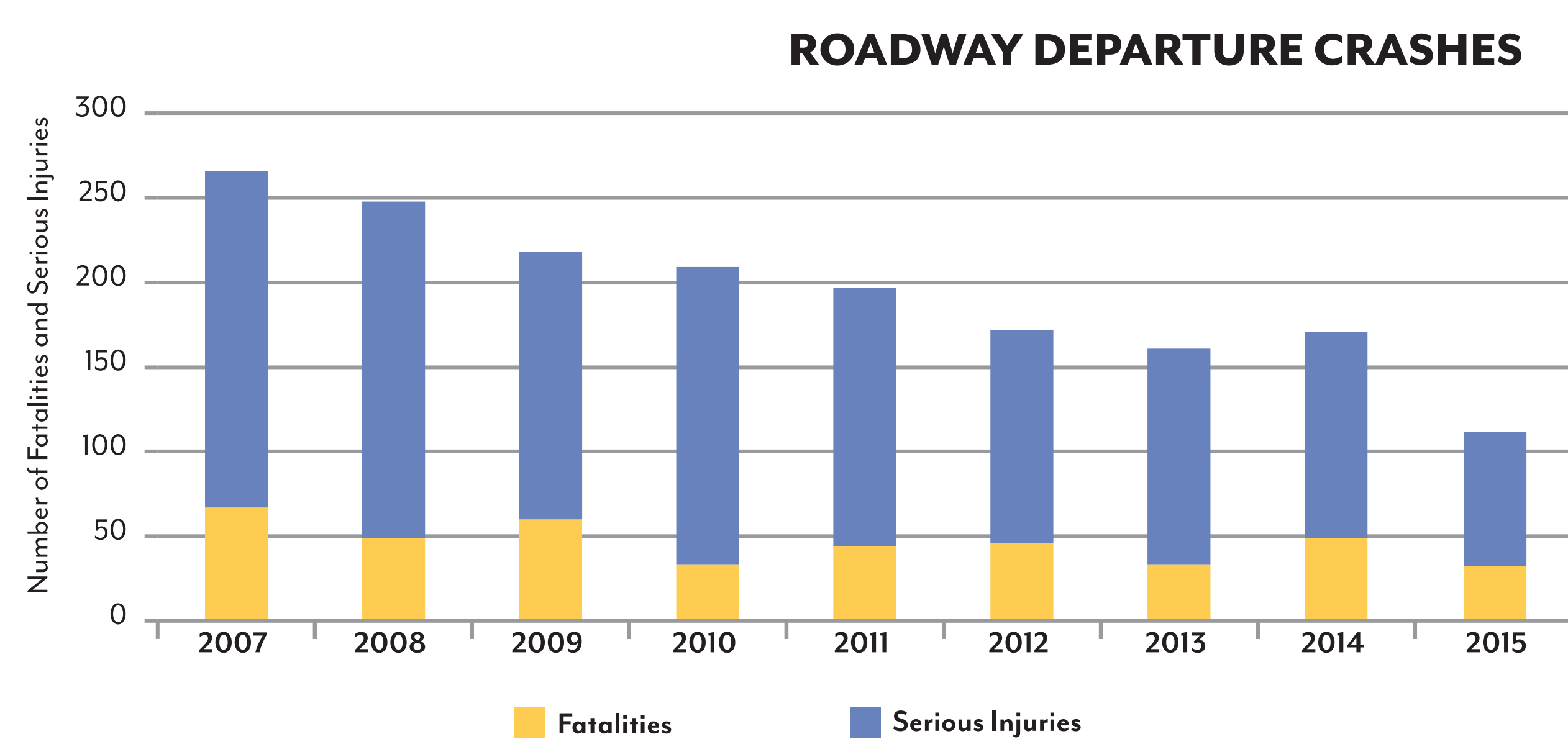
HIGH FRICTION SURFACE TREATMENTS



Addressing Delaware's Strategic Highway Safety Plan (SHSP) Roadway Departure Emphasis Area by targeting the reduction of fatal and serious injuries resulting from roadway departure crashes

Background

The intent of DeIDOT's Systemic Safety Improvement Program is to identify candidate locations expected to benefit with the implementation of specific safety improvements. Based on the 2015 Delaware Strategic Highway Safety Plan (SHSP), 24% of all fatalities and serious injuries in the state of Delaware from 2007 to 2014 occurred in a roadway departure crash. Additional crash data reviewed since the 2015 SHSP indicates that 38% of fatalities and 21% of serious injuries involved a roadway departure crash (2007 to 2015). Furthermore, wet/snowy/icy pavement has been identified as a major contributing factor in roadway departure crashes, accounting for 22% of all roadway departure fatalities and serious injuries in Delaware. High-friction surface treatments (HFST) are proven to reduce the potential for crashes that occur on wet pavement.



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AND 21% OF SERIOUS
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ROADWAY
DEPARTURE
(2007 - 2015 CRASH DATA)

Site Selection

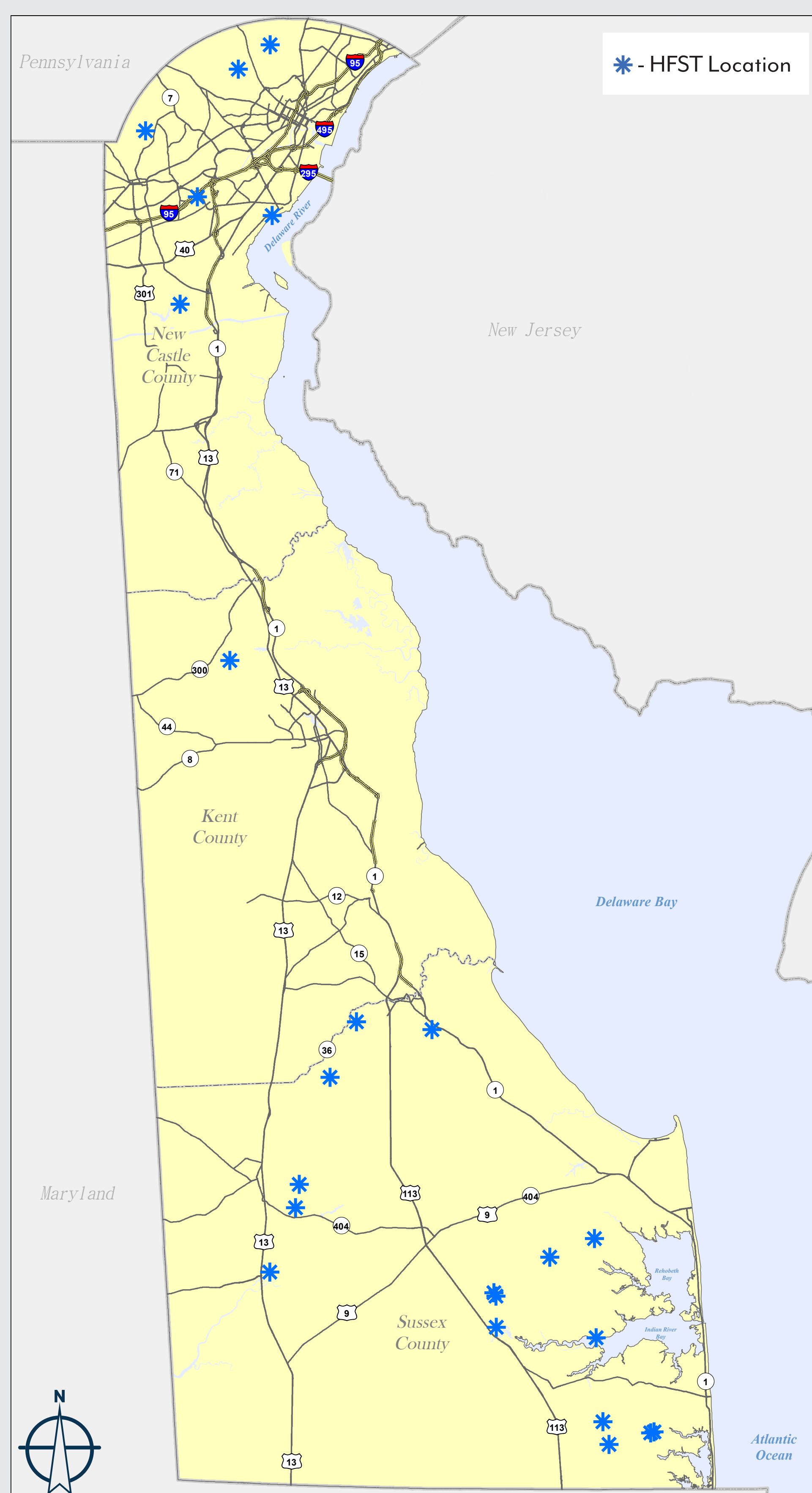
- Candidate locations are identified that have a high rate of roadway departure crashes that occurred on wet/snowy/icy pavement.
- The total number of wet pavement roadway departure crashes for each segment is divided by the traffic volume and roadway length to generate crash rates per million vehicle-miles-traveled.
- The screening process segments roadways using a 0.05-mile sliding scale and a 0.3-mile segment length, and requires sites to have a minimum of 3 roadway departure crashes on wet/snowy/icy pavement.
- After identifying locations with high wet-weather crash rates, adjacent segments of roadway that meet the minimum criteria are then combined into a single site.



Location Screening

Once candidate locations are identified, each location is screened to determine the feasibility and appropriateness of installing HFST. Factors considered include pavement condition, date of last resurfacing project, date of next resurfacing project, and presence of horizontal curvature.

Implementation



DeIDOT utilizes a three-year open-end contract established for HFST implementation using HSIP, HRRRP, and Section 154 Penalty Transfer Funds. To date, 33,396 SY of HFST has been installed at over 20 locations since the contract was awarded.

HFST is a type of ultra-thin pavement overlay that utilizes an epoxy resin or polymer binder and high-quality, polish-resistant aggregate. The binder material is applied to a section of pavement and the aggregate is spread over the binder material. The aggregates are polish-resistant and abrasion-resistant, resulting in a higher pavement friction and longer-lasting overall friction.

DeIDOT uses a polymeric resin binder, which is a two-part thermosetting modified exothermic polymeric resin compound that holds the aggregate firmly in position. DeIDOT uses a calcined bauxite aggregate that is the most common type of aggregate used in HFST treatments across the country.

The material is applied using a truck-mounted application machine capable of mechanically mixing, metering, monitoring, and applying the binder resin system and high-friction aggregate in one continuous pass.

Evaluation

Crash Experience: Before and after crash data were reviewed to determine the effectiveness of HFST. The results indicate the following:



At all but one location, the number of wet-weather roadway departure crashes per year **decreased**.



At 19 of 23 locations, **zero wet-weather roadway departure crashes** were reported during the after period (which ranges from approximately 5 months to 18 months).



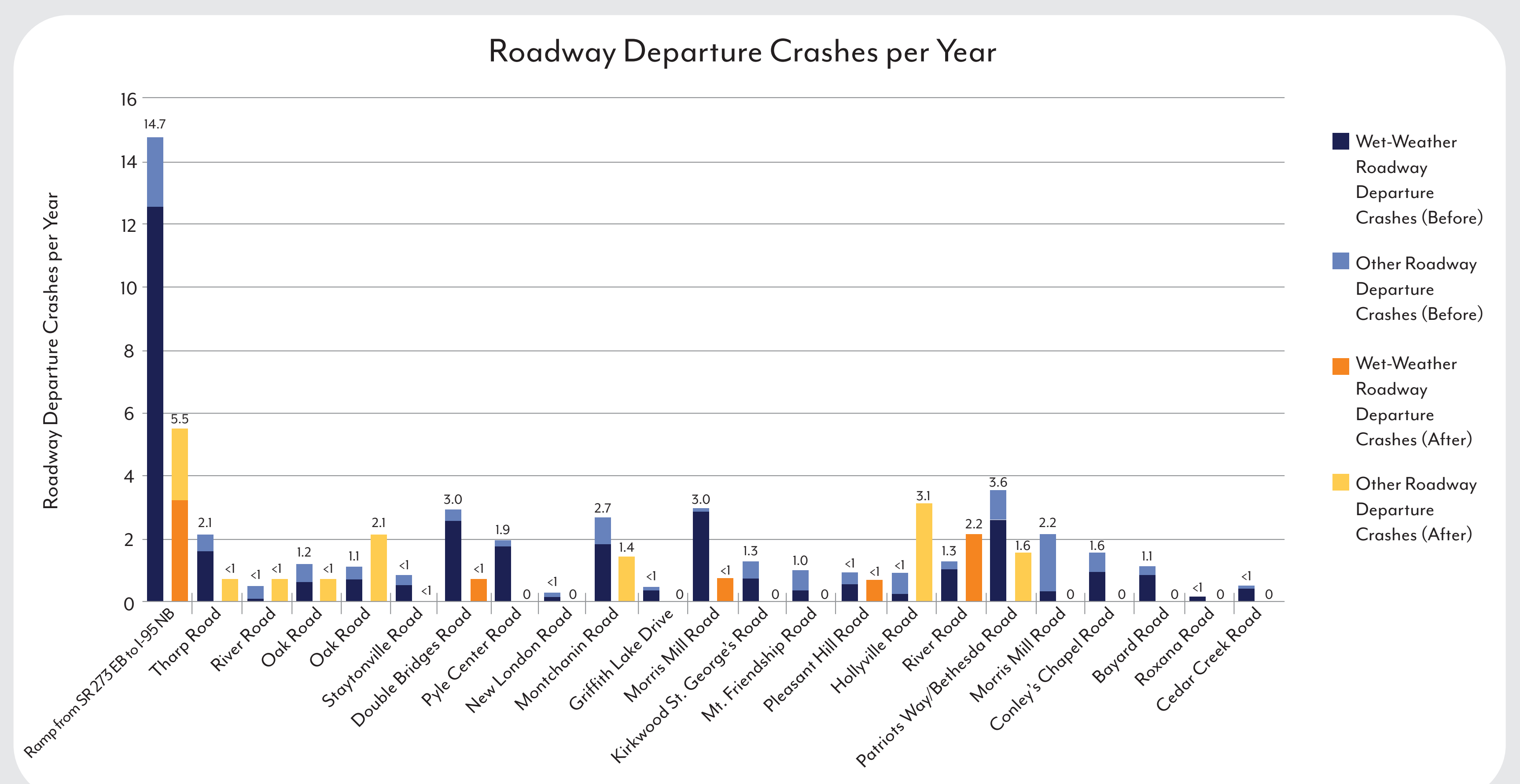
The **total number of wet-weather crashes per year decreased** at 91% of the locations and by an overall average of **55%**.



The **total number of crashes per year decreased** at 70% of the locations and by an overall average of **21%**.



The **total number of roadway departure crashes** per year decreased at 83% of the locations and by an overall average of **56%**.



Durability: HFST was installed at a test location in September 2013 and has since been exposed to two very harsh winter seasons. The findings show that the material is very durable and has withstood impacts from DeIDOT plow trucks and applications of salt with little to no displacement of the aggregate and no removal of the resin binder material from the pavement surface.

